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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/053,152	01/23/2002	John Michael Miller	200-0459	8695

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EXAMINER

BENENSON, BORIS

ART UNIT PAPER NUMBER

2836

DATE MAILED: 10/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Applicati n No.		Applicant(s)	
	10/053,152		MILLER, JOHN MICHAEL	
	Examiner		Art Unit	
	Boris Benenson		2836	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 06 August 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 34-49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 34-49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

1. In view of the appeal brief filed on 08/06/2003, PROSECUTION IS HEREBY REOPENED. New grounds of rejections are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

RESPONSE TO ARGUMENTS

2. The finality of previous Office Action has been withdrawn in order to provide proper treatment of Claim 47.

3. Applicant argues that rejection of Claims 34-38 and 42-46 is lacking motivation to combine Diehl and Ule. Applicant points that Diehl teaches, "utilizing the resonance of the two springs in the actuator 18 to accomplish much of the movement, the response time is improved over merely providing

Art Unit: 2836

electromagnets, and with less power consumption" and therefore there is no needs for further improvement in power consumption and saving the energy. Such an argument is missing the fact that in order to hold the valve in open or closed position one or other magnet should be energized to overcome a force of the spring. In the beginning of next cycle that magnet is deenergized and an opposite magnet (solenoid) should be energized. Ule teaches a way to transfer the magnetic energy from a first solenoid to a second solenoid, which is being energized. Combining Diehl and Ule will provide additional energy saving and a fast rate of valve opening/closing.

4. Applicant argues that rejection of Claims 34-38 and 42-46, based on combination of Diehl and Ule does not teach transferring energy generated in a first electromechanical exhaust valve during closing of said first valve to a second electromechanical cylinder intake valve to open said second valve. This argument is not convincing because one of ordinary skill in the art at the time the invention was made would have recognized that teachings found in Ule useful for the controller of Diehl described as "a conventional type of controller, such as an engine computer" (Col.3, Lines 26-27) which controls electrical elements of many cylinders according to a desired timing diagram and therefore transferring energy generated in a valve of one cylinder of an engine to any other valve of any cylinder of the same engine.

5. Applicant argues that rejection of Claims 39-41 is improper due lack of motivation for combination Diehl and Ule. As it was discussed relative to Claims 34-38 and 42-46, such an argument is not convincing.

Art Unit: 2836

6. Applicant argues also that Claims 39-41 include a limitation of recirculation a current generated in a first electromechanical exhaust valve while decelerating said first valve towards closed position to a second electromechanical cylinder intake valve to open said second valve. Such limitation is equivalent to "the energy of one electromagnet being de-energized can be used to produce the high voltage to energize the second electromagnet" of Ule and therefore meets the limitations of Claims 34-38.

7. Applicant's argument related to rejection of Claim 47 is moot in light of newly provided rejection.

8. Applicant argues that combination of Diehl with Reinicke and Ueda in rejection of Claims 48-49 has no motivation. The argument is not convincing.

Diehl et al. discloses an electromechanically activated valve for use as intake or exhaust valve on internal combustive engine (col.2, line 58). An electromechanical actuator assembly includes a set of electromagnets for actuating valves. Reinicke teaches a motor-operated valve, which "employs a motor-driven ball-screw system to develop requisite axial displacement for the valve member" (Col.1, Lines 19-21). It is obvious to consider replacement of electromagnet-actuated valves with motor-operated valves because this allows save an electrical energy by

Art Unit: 2836

eliminating necessity of "holding" current in order to keep a valve in open/closed position with enough force to overcome a force of springs. Ueda et al. teach a method for controlling a system that includes a plurality of accelerating and decelerating motors and inverters to control such motors. That method provides an energy saving by redirecting "regenerating energy, generated upon deceleration to be consumed by the motors being accelerated" (Col.3, Lines 42-45). A system for controlling valve operation in an engine inherently includes a group of actuators (mechanical or electromechanical) for simultaneously controlling intake and exhaust valves for all cylinders of the engine. The energy saving method of controlling a plurality of electrical motors obviously should be considered for motor-operated multi-valve system.

Claim Objections

9. Claims 35, 39, 40, 41, 47 and 48 objected to because of the following informalities: Claims recite the limitation "decelerating" while the specification uses a term "de-accelerating". Appropriate correction is required.

Art Unit: 2836

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 34-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Diehl et al. (5,765,513) in view of Ule (3,896,346). Diehl et al. discloses an electromechanically actuated valve (12) for use as an intake or exhaust valve in an internal combustion engine (Abstract, lines 1-2). Diehl doesn't disclose a method for utilizing the energy accumulated during slowing a valve down (read on de-accelerating) by transferring it to a valve being accelerated. Ule teach a high speed electromagnet control circuit where both actuation and de-actuation speed of the electromagnet are increased and rapid de-actuation is achieved either by a high reverse voltage applied to the solenoid and the return of its energy to the power source or by a diode and capacitor network which transfers the magnetic energy to a second solenoid which thereupon becomes energized

Art Unit: 2836

(Abstract Lines 11-17). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified electromechanically activated valve disclosed by Diehl et al. with teachings of Ule, because it will enable valves to open and close at fast rate and save energy.

Claims 34-46 describe substantially similar methods.

Limitations as

- a) "Transferring electrical energy generated ...",
- b) "Recirculating a current generated ...",
- c) " Reversing a flow of current... and directing said current."
- d) " Generating a current in first electromechanical cylinder exhaust valve... and routing said current to second electromechanical cylinder intake valve..." are identical limitations. The steps of transferring energy generated during closing exhaust valve of one cylinder to different cylinder to open its intake valve and transferring energy generated during closing intake valve of one cylinder to different cylinder to open its exhaust valve are similar in their nature and defined by timing diagram of the engine controller, which is inherent in the method.

11. Claims 47-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Diehl et al. (5,765,513) in view of Reinicke (5,318,064) and Ueda et al. (5,150,020).

Art Unit: 2836

Diehl et al. disclose an electromechanically activated valve for use as intake or exhaust valve on internal combustive engine (col.2, line 58). Diehl does not disclose use of an electrical motor for actuating a valve of an engine. Reinicke teaches a motor-operated valve, which "employs a motor-driven ball-screw system to develop requisite axial displacement for the valve member" (Col.1, Lines 19-21). In such design "Great mechanical advantage is achieved for relatively low motor-torque delivery" (Abstract). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Diehl to use a motor-driven ball-screw system, because it provides relatively low motor-torque delivery. Neither Diehl et al. or Reinicke disclose a method for conserving power in an electrical control system, including plurality of the motors. Ueda et al. teach a Driving Controlling Method for Drums of Automatic Winder. That automatic winder includes a plurality of accelerating and decelerating motors and inverters to control such motors. The method effectively controls the motors by redirecting "regenerating energy, generated upon deceleration to be consumed by the motors being accelerated" (Col.3, Lines 42-45).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the

Art Unit: 2836

electromechanical valve of Diehl et al. to use a motor to drive the valve as taught by Reinicke because this allows control an engine by controlling the valve's position, valve's dwell time duration, valve's opening and closing rate.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of controlling the electromechanical valve of Diehl et al. and Reinicke to use recaptured potential energy from one valve to drive another valve as taught by Ueda et al. because this allows regenerated energy to be utilized which saves energy.

Contact information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Boris Benenson whose telephone number is (703) 305-6917. The examiner can normally be reached on M-F (8:20-6:00) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on (703) 308-3119. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Art Unit: 2836

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Boris Benenson
Examiner
Art Unit 2836

B.B.

A handwritten signature in black ink, appearing to read 'B. Sircus', with a stylized flourish at the end.

BRIAN SIRCUS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800